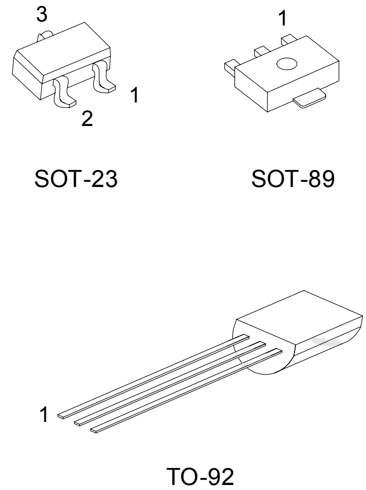
VOLTAGE DETECTORS WITH BUILT-IN DELAY TIME



*Pb-free plating product number: 81CXXXL/81NXXXL

■ DESCRIPTION

The UTC **81CXXX** and **81NXXX** series are good performance voltage detector and manufactured by CMOS technologies with highly accurate, low power consumption. A delay circuit is built-in to each detector, therefore, peripherals are unnecessary and high density mounting is possible. Detect voltage is extremely accurate with minimal temperature drift. Both CMOS and N-channel open drain output configurations are available.

■ FEATURES

*Highly Accurate : Detect voltage ± 2%
*Built-In Delay time : 1ms ~ 50ms,
50ms ~ 200ms,
200ms ~ 400ms,
*Detect Voltage Temperature Characteristics:
TYP± 100ppm/℃
*Wide Operating Voltage Range : 0.7V ~ 10.0V
*Low Current Consumption : TYP 1.0 μA (V_{IN}=2.0V)

■ ORDERING INFORMATION

CMOS:

Order Number		①:Delay Time		Package	Pin Assign.			Packing
Normal	Lead Free Plating	Duration	Code		1	2	3	
81**C**xx-①-AB3-E-R	81**C**xxL-①-AB3-E-R			SOT-89	O	I	G	Tape Reel
81**C**xx-①-AE3-3-R	81**C**xxL-①-AE3-3-R			SOT-23	O	G	I	Tape Reel
81**C**xx-①-AE3-5-R	81**C**xxL-①-AE3-5-R	1 ~ 50 ms	P	SOT-23	G	O	I	Tape Reel
81**C**xx-①-T92-D-B	81**C**xxL-①-T92-D-B	50 ~ 200 ms	Q	TO-92	I	G	O	Tape Box
81**C**xx-①-T92-E-B	81**C**xxL-①-T92-E-B	200 ~ 400 ms	R	TO-92	O	I	G	Tape Box
81**C**xx-①-T92-D-K	81**C**xxL-①-T92-D-K			TO-92	I	G	O	Bulk
81**C**xx-①-T92-E-K	81**C**xxL-①-T92-E-K			TO-92	O	I	G	Bulk

N-Channel:

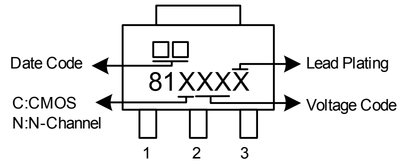
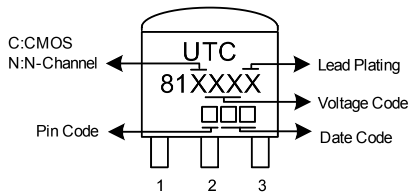
Order Number		①:Delay Time		Package	Pin Assign.			Packing
Normal	Lead Free Plating	Duration	Code		1	2	3	
81**N**xx-①-AB3-E-R	81**N**xxL-①-AB3-E-R			SOT-89	O	I	G	Tape Reel
81**N**xx-①-AE3-3-R	81**N**xxL-①-AE3-3-R			SOT-23	O	G	I	Tape Reel
81**N**xx-①-AE3-5-R	81**N**xxL-①-AE3-5-R	1 ~ 50 ms	H	SOT-23	G	O	I	Tape Reel
81**N**xx-①-T92-D-B	81**N**xxL-①-T92-D-B	50 ~ 200 ms	J	TO-92	I	G	O	Tape Box
81**N**xx-①-T92-E-B	81**N**xxL-①-T92-E-B	200 ~ 400 ms	K	TO-92	O	I	G	Tape Box
81**N**xx-①-T92-D-K	81**N**xxL-①-T92-D-K			TO-92	I	G	O	Bulk
81**N**xx-①-T92-E-K	81**N**xxL-①-T92-E-K			TO-92	O	I	G	Bulk

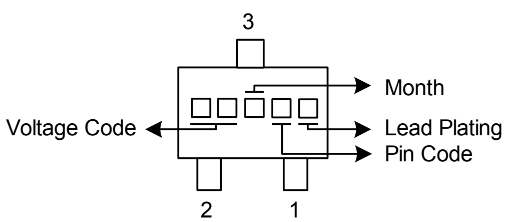
Note: 1. Pin assignment: I:Vin O:Vout G:Vss
2.xx: Output Voltage, refer to Marking Information.

ORDERING INFORMATION(Cont.)

81CxxL-①-AB3-x-R	
(1)Packing Type	(1) R: Tape Reel, B: Tape Box, K: Bulk
(2)Pin Code	(2) refer to Pin Assignment
(3)Package Type	(3) AB3: SOT-89, AE3: SOT-23, T92: TO-92
(4)Delay Time	(4) ①: refer to Delay Time
(5)Lead Plating	(5)L: Lead Free Plating, Blank: Pb/Sn
(6)Output Voltage Code	(6) xx: refer to Marking Information
(7)Output Configuration	(7) C: CMOS, N: N-Cannel

MARKING INFORMATION

PACKAGE	VOLTAGE CODE			MARKING
SOT-89	10:1.0V			
	11:1.1V	26:2.6V		
	12:1.2V	27:2.7V	40:4.0V	
	13:1.3V	28:2.8V	41:4.1V	
	14:1.4V	29:2.9V	42:4.2V	
	15:1.5V	30:3.0V	43:4.3V	
	16:1.6V	31:3.1V	44:4.4V	
	17:1.7V	32:3.2V	45:4.5V	
	18:1.8V	33:3.3V	46:4.6V	
TO-92	19:1.9V	34:3.4V	47:4.7V	
	20:2.0V	35:3.5V	48:4.8V	
	21:2.1V	36:3.6V	49:4.9V	
	22:2.2V	37:3.7V	50:5.0V	
	23:2.3V	38:3.8V		
	24:2.4V	39:3.9V		
	25:2.5V			

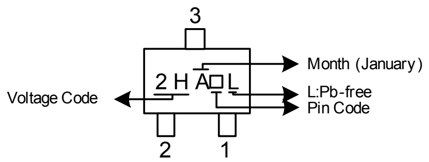
PACKAGE	INTEGER*	CODE	DECIMAL**	CODE	MARKING
SOT-23	1.	1	.0	A	
	2.	2	.1	B	
	3.	3	.2	C	
	4.	4	.3	D	
	5.	5	.4	E	
	6.	6	.5	F	
			.6	G	
			.7	H	
			.8	J	
			.9	K	

* Represents the integer of the Detect Voltage

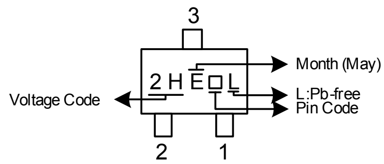
** Represents the decimal number of the Detect Voltage

EXAMPLE:

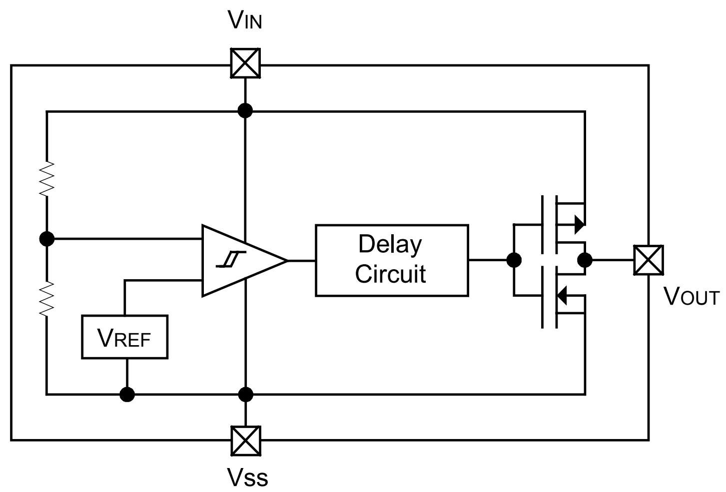
81C27P



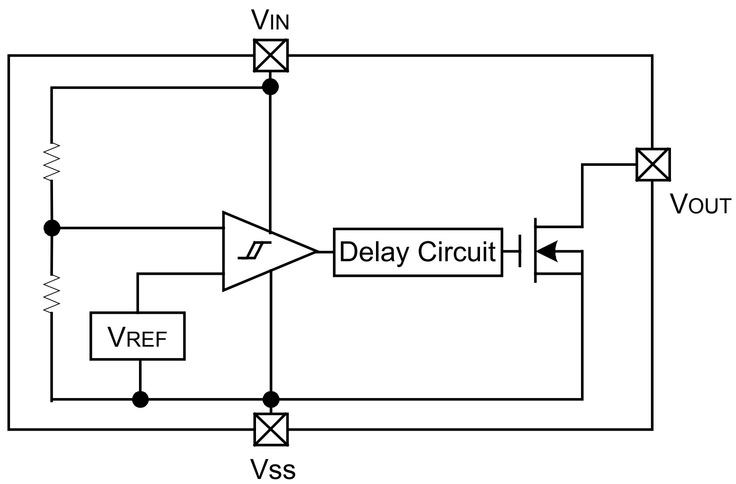
81N27H



■ BLOCK DIAGRAM



CMOS Output



N-channel Open Drain Output

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	12	V
Output Current		I_{OUT}	50	mA
Output Voltage	CMOS	V_{OUT}	V_{SS}-0.3 ~ V_{IN}+0.3	V
	N-Ch open drain		V_{SS}-0.3 ~ 9	
Power Dissipation	SOT-23	P_D	150	mW
	SOT-89		500	
	TO-92		300	
Operating Temperature		T_{OPR}	-30 ~ +80	°C
Storage Temperature		T_{STG}	-40 ~ +125	°C

Note Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Case	SOT-23	θ_{JC}	200	°C/W
	SOT-89		100	
	TO-92		45	

■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

Detection voltage (1.0V ~ 1.9V)

PARAMETER	SYMBOL	CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detect Voltage	V_{DF}	1		V_{DF} (T) X0.98	V_{DF} (T)	V_{DF} (T) X1.02	V
Hysteresis Range	V_{HYS}	1		V_{DF} X0.02	V_{DF} X0.05	V_{DF} X0.08	V
Operating Voltage	V_{IN}	1	V_{DF}=1.6V ~ 6.0V	0.7		10.0	V
Supply Current	I_{SS}	2	V_{IN}=1.5V		0.9	2.6	μA
			V_{IN}=5.0		2.0	4.2	μA
Output Current	I_{OUT}	3	N-ch V_{DS}=0.5V, V_{IN} =1.0V		2.2		mA
		4	P-ch V_{DS}=2.1V, V_{IN}=8.0V (CMOS output)		-15.4		mA
V_{DF} Temperature Characteristics	$\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$				±100		ppm/°C
Transient Delay Time (V_{DR} → V_{OUT} inversion)	t_{DLY} *	5	V_{IN} changes from 0.6V ~ 10V	50		200	ms

■ ELECTRICAL CHARACTERISTICS(Cont.)

Detection voltage (2.0V ~ 2.9V)

PARAMETER	SYMBOL	CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detect Voltage	V_{DF}	1		V_{DF} (T) X0.98	V_{DF} (T)	V_{DF} (T) X1.02	V
Hysteresis Range	V_{HYS}	1		V_{DF} X0.02	V_{DF} X0.05	V_{DF} X0.08	V
Operating Voltage	V_{IN}	1	V_{DF}=1.6V ~ 6.0V	0.7		10.0	V
Supply Current	I_{SS}	2	V_{IN}=2.0V		1.0	3.0	μA
			V_{IN}=5.0V		2.0	4.2	μA
Output Current	I_{OUT}	3	N-ch V_{DS}=0.5V, V_{IN} =2.0V		7.9		mA
		4	P-ch V_{DS}=2.1V, V_{IN}=8.0V (CMOS output)		-15.4		mA
V_{DF} Temperature Characteristics	$\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$				±100		ppm/℃
Transient Delay Time (V_{DR} → V_{OUT} inversion)	t_{DLY} *	5	V_{IN} changes from 0.6V ~ 10V	50		200	ms

Detection voltage (3.0V ~ 3.9V)

PARAMETER	SYMBOL	CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detect Voltage	V_{DF}	1		V_{DF} (T) X0.98	V_{DF} (T)	V_{DF} (T) X1.02	V
Hysteresis Range	V_{HYS}	1		V_{DF} X0.02	V_{DF} X0.05	V_{DF} X0.08	V
Operating Voltage	V_{IN}	1	V_{DF}=1.6V ~ 6.0V	0.7		10.0	V
Supply Current	I_{SS}	2	V_{IN} =3.0V		1.3	3.4	μA
			V_{IN} =5.0V		2.0	4.2	μA
Output Current	I_{OUT}	3	N-ch V_{DS}=0.5V, V_{IN} =3.0V		10.1		mA
		4	P-ch V_{DS}=2.1V, V_{IN}=8.0V (CMOS output)		-15.4		mA
V_{DF} Temperature Characteristics	$\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$				±100		ppm/℃
Transient Delay Time (V_{DR} → V_{OUT} inversion)	t_{DLY} *	5	V_{IN} changes from 0.6V ~ 10V	50		200	ms

■ ELECTRICAL CHARACTERISTICS(Cont.)

Detection voltage (4.0V ~ 4.9V)

PARAMETER	SYMBOL	CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detect Voltage	V_{DF}	1		V_{DF} (T) X0.98	V_{DF} (T)	V_{DF} (T) X1.02	V
Hysteresis Range	V_{HYS}	1		V_{DF} X0.02	V_{DF} X0.05	V_{DF} X0.08	V
Operating Voltage	V_{IN}	1	V_{DF}=1.6V ~ 6.0V	0.7		10.0	V
Supply Current	I_{SS}	2	V_{IN}=4.0V		1.5	3.8	μA
			V_{IN}=5.0V		2.0	4.2	μA
Output Current	I_{OUT}	3	N-ch V_{DS}=0.5V, V_{IN}=4.0V		11.5		mA
		4	P-ch V_{DS}=2.1V, V_{IN}=8.0V (CMOS output)		-15.4		mA
V_{DF} Temperature Characteristics	$\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$				±100		ppm/℃
Transient Delay Time (V_{DR} → V_{OUT} inversion)	t_{DLY} *	5	V_{IN} changes from 0.6V ~ 10V	50		200	ms

Detection voltage (5.0V)

PARAMETER	SYMBOL	CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detect Voltage	V_{DF}	1		V_{DF} (T) X0.98	V_{DF} (T)	V_{DF} (T) X1.02	V
Hysteresis Range	V_{HYS}	1		V_{DF} X0.02	V_{DF} X0.05	V_{DF} X0.08	V
Operating Voltage	V_{IN}	1	V_{DF}=1.6V ~ 6.0V	0.7		10.0	V
Supply Current	I_{SS}	2	V_{IN}=5.0V		2.0	4.2	μA
Output Current	I_{OUT}	3	N-ch V_{DS}=0.5V, V_{IN} =5.0V		13.0		mA
		4	P-ch V_{DS}=2.1V, V_{IN}=8.0V (CMOS output)		-15.4		mA
V_{DF} Temperature Characteristics	$\frac{\Delta V_{DF}}{\Delta T_{OPR} \times V_{DF}}$				±100		ppm/℃
Transient Delay Time (V_{DR} → V_{OUT} inversion)	t_{DLY} *	5	V_{IN} changes from 0.6V ~ 10V	50		200	ms

V_{DF} (T): established detect voltage value

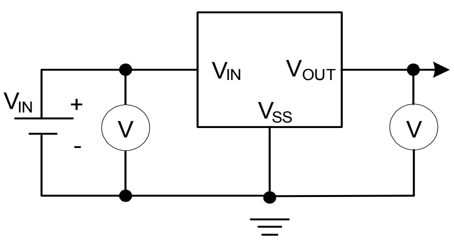
Release Voltage: V_{DR} = V_{DF} + V_{HYS}

* Transient Delay Time: 1ms ~ 50ms & 200ms ~ 400ms versions are also available.

Note: The power consumption during power-start to output being stable (release operation) is 2 μA greater than it is after that period (completion of release operation) because of delay circuit through current.

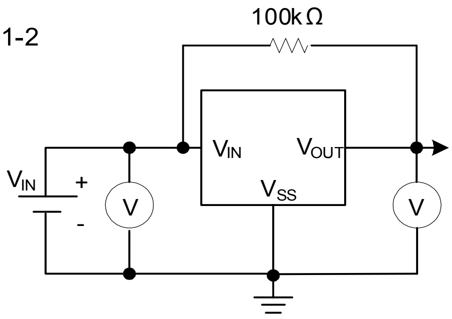
■ TEST CIRCUITS

1-1



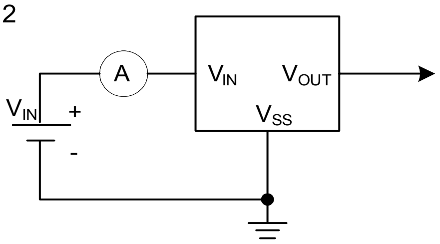
Cmos Output

1-2

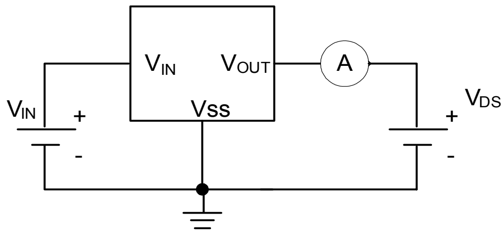


N-channel Open Drain Output

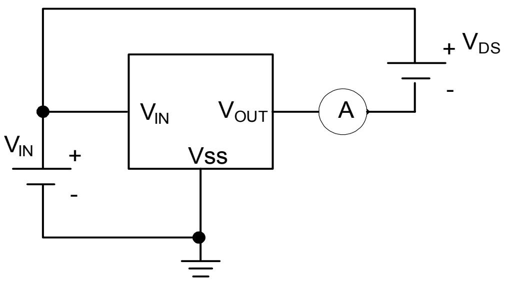
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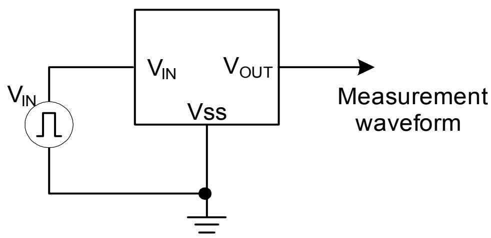
3



4

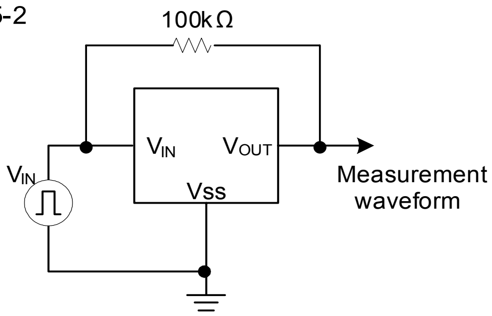


5-1



Cmos Output

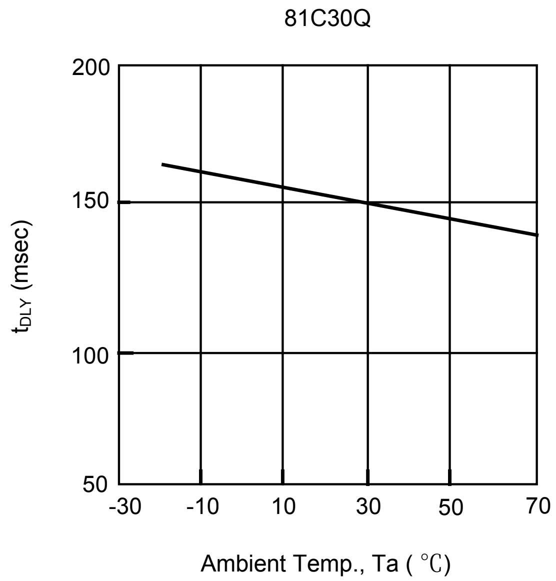
5-2

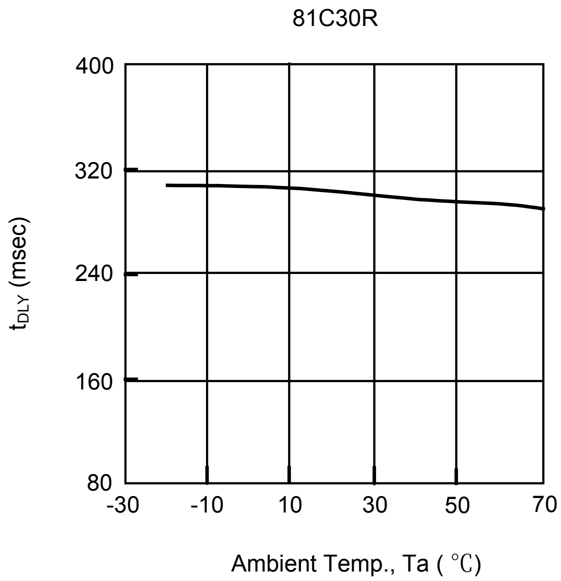


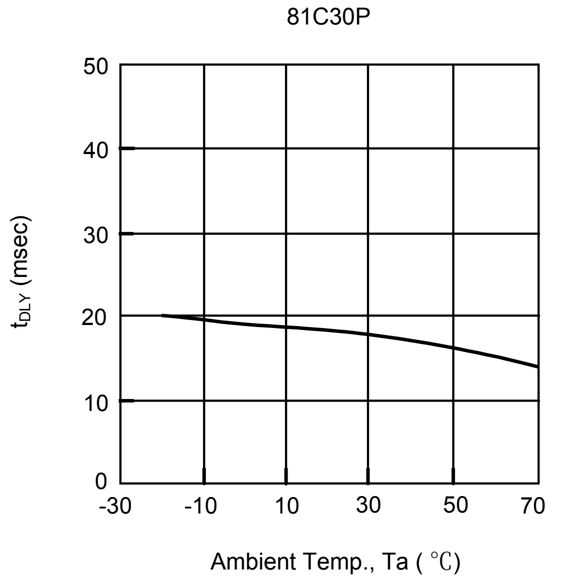
N-channel Open Drain Output

■ TYPICAL PERFORMANCE CHARACTERISTICS

(1) AMBIENT TEMPERATURE vs. TRANSIENT DELAY TIME

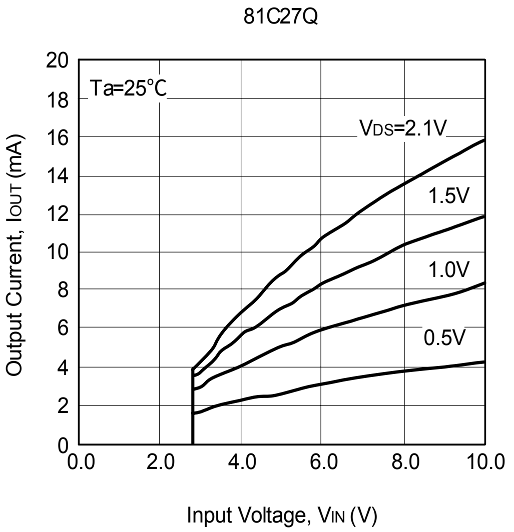


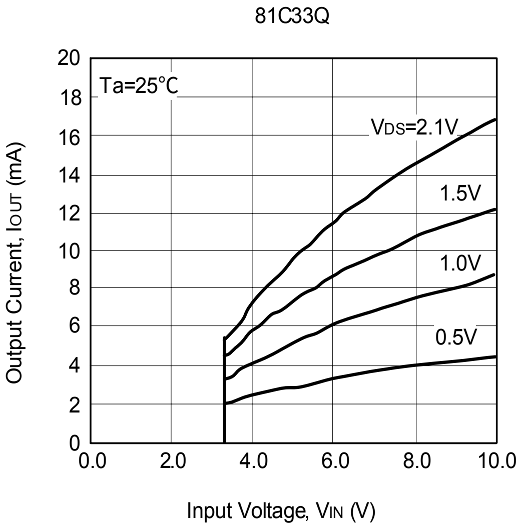


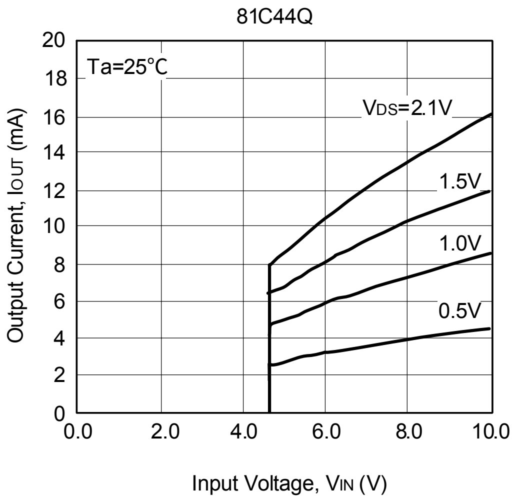


■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

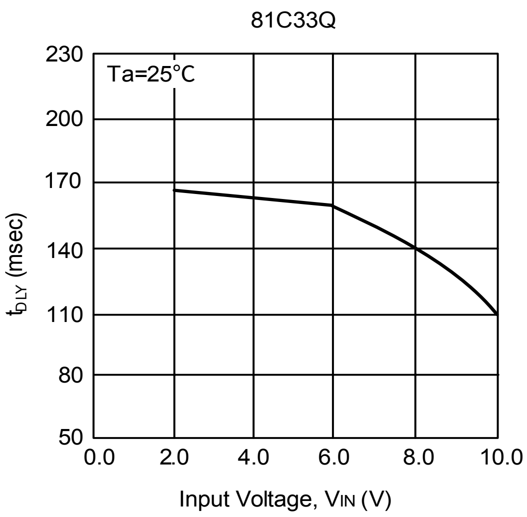
(2) P-CHANNEL DRIVER OUTPUT CURRENT vs. INPUT VOLTAGE





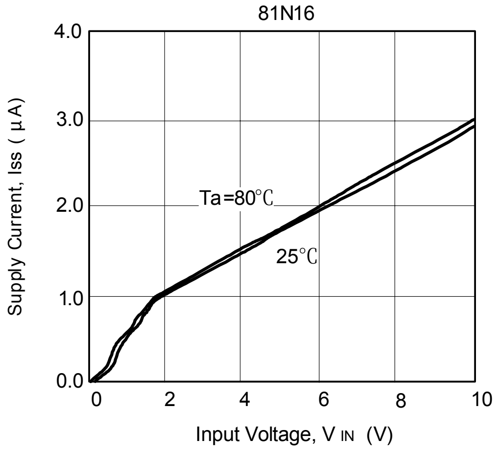


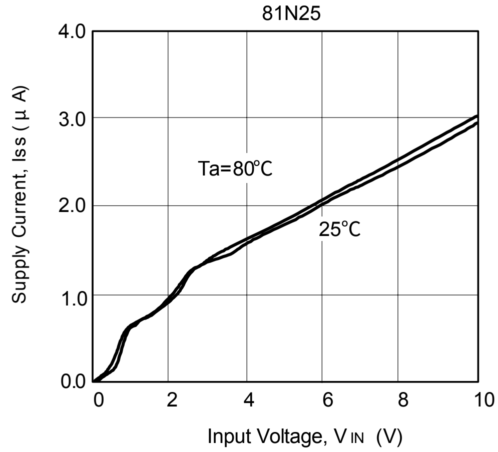
(2) TRANSIENT DELAY TIME vs. INPUT VOLTAGE

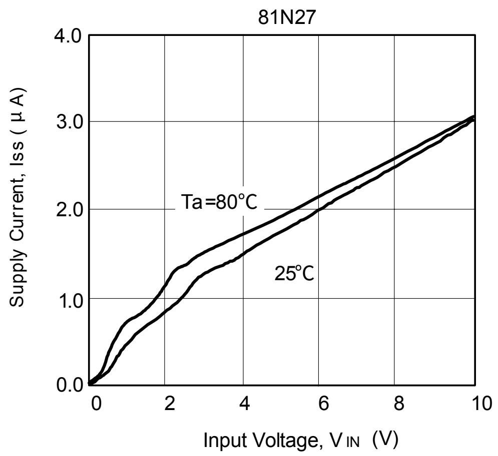


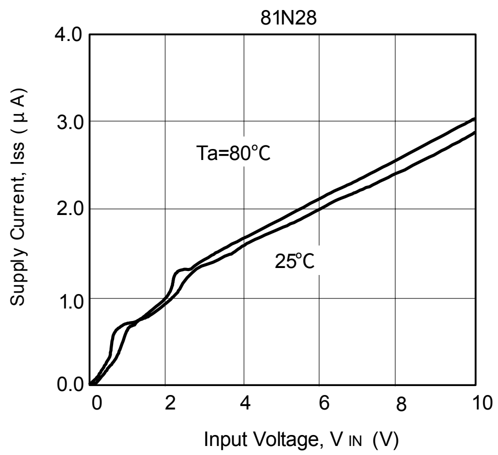
■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

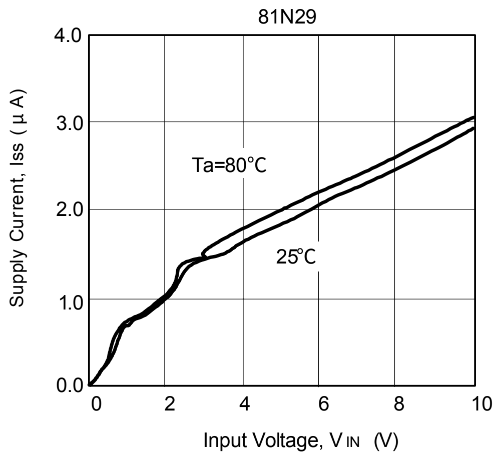
(3) SUPPLY CURRENT vs. INPUT VOLTAGE

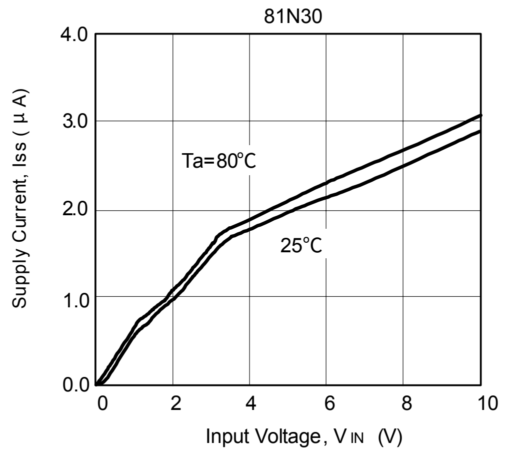




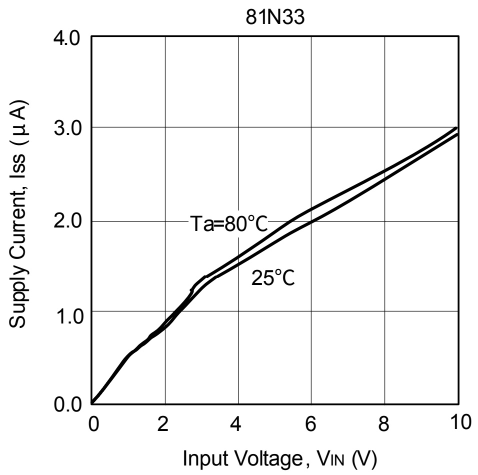


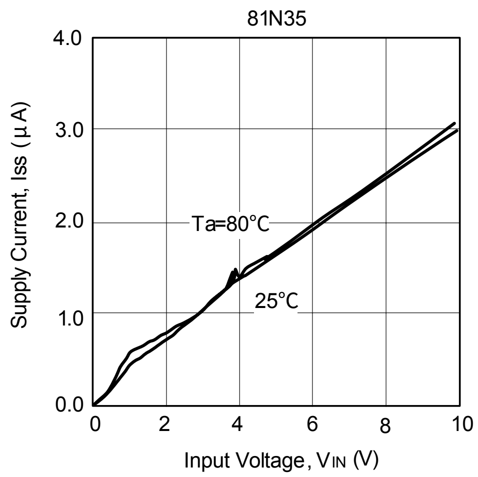




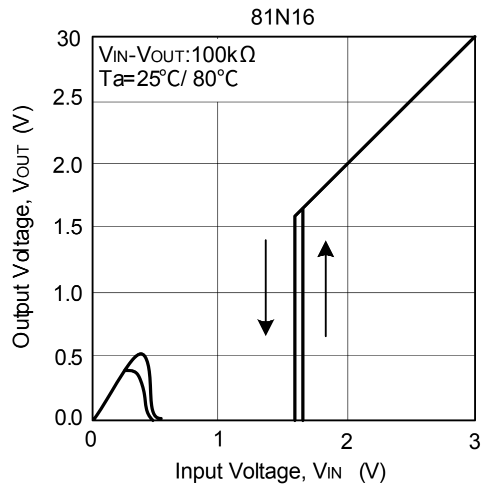


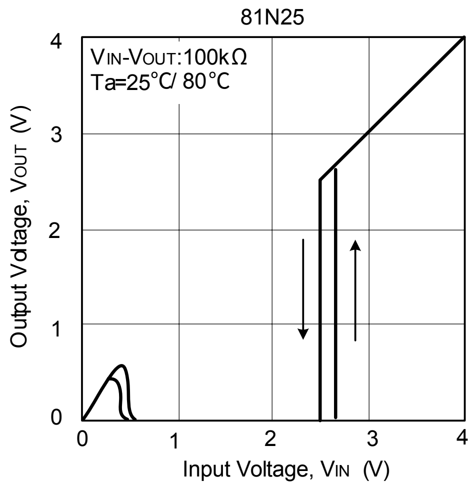
■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

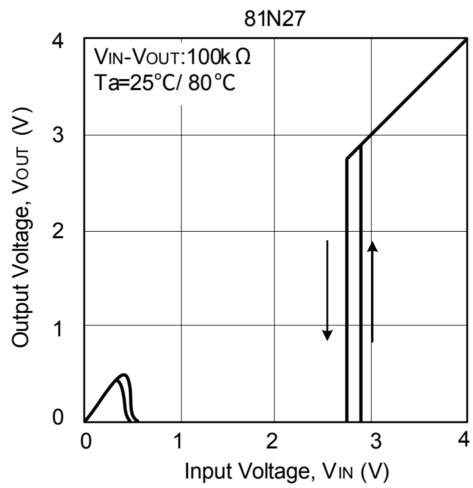


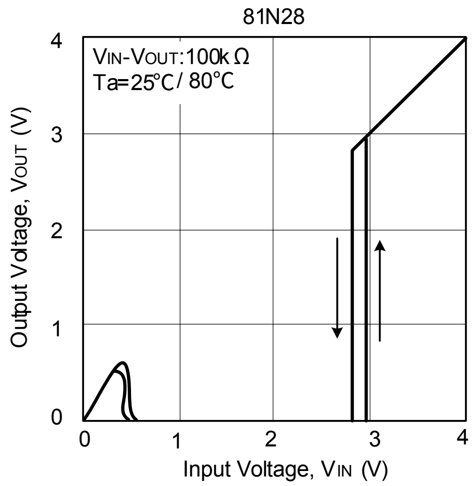


(4) OUTPUT VOLTAGE vs. INPUT VOLTAGE

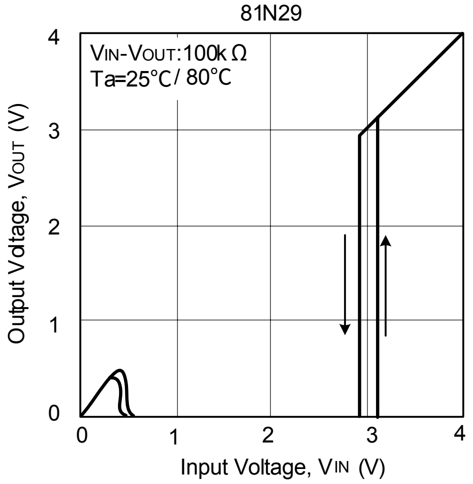


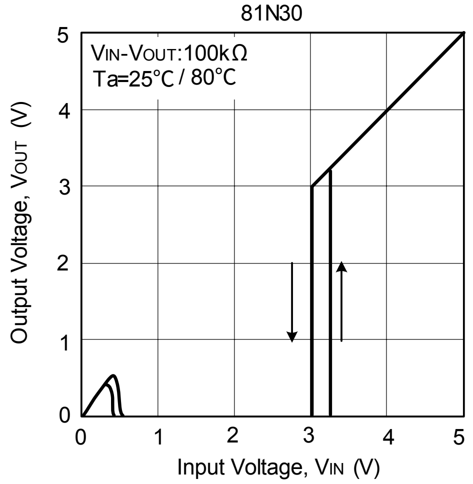


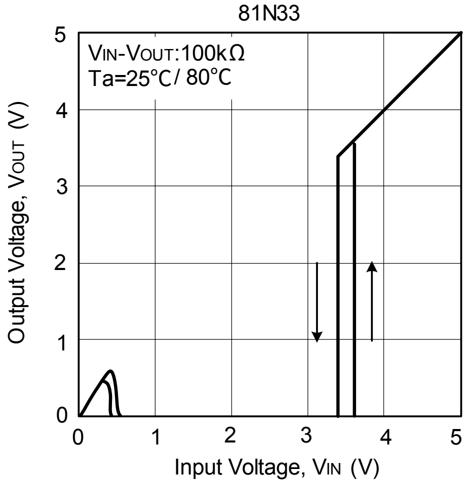


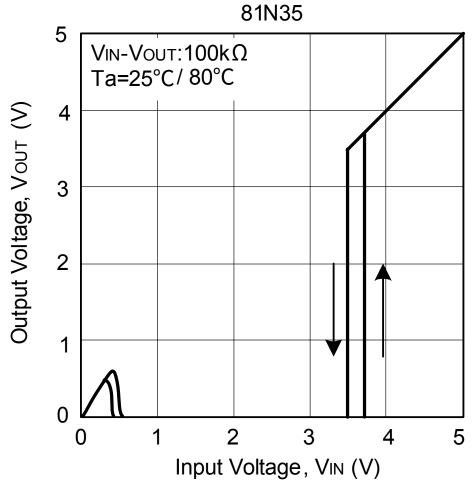


■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

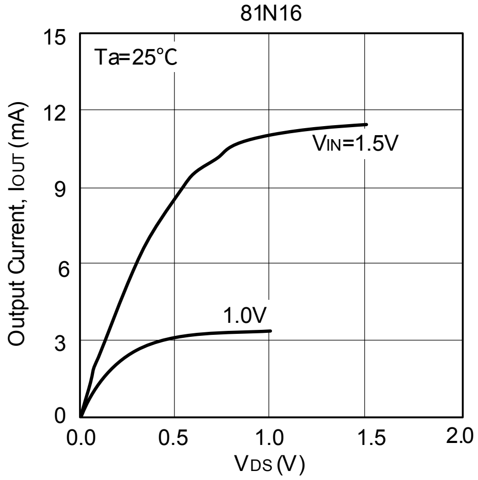


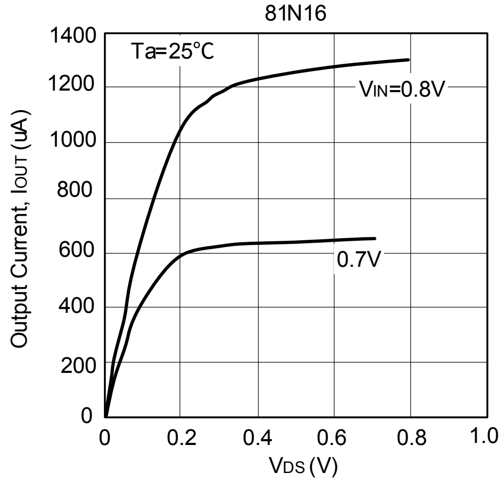




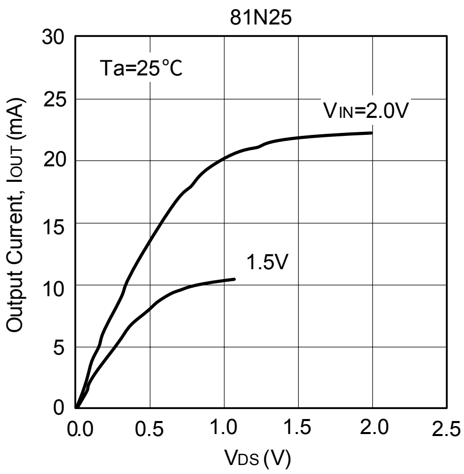


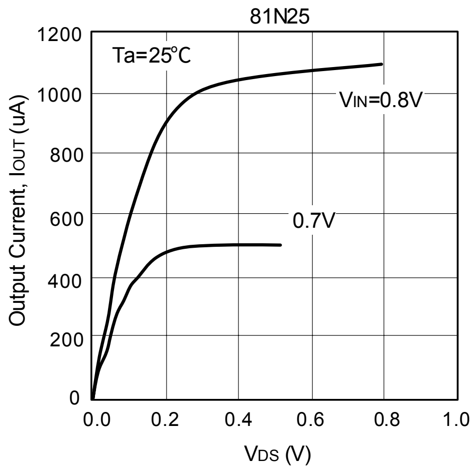
(5) N-CHANNEL DRIVRE OUTPUT CURRENT vs. V_{DS}

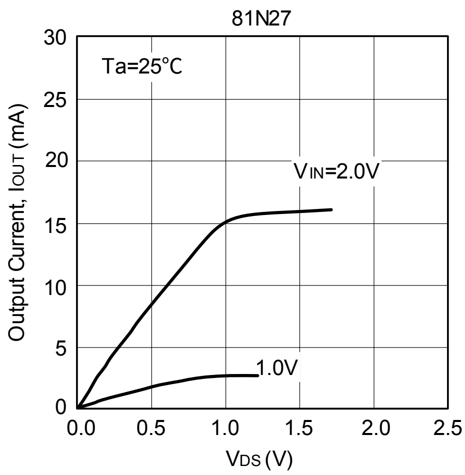


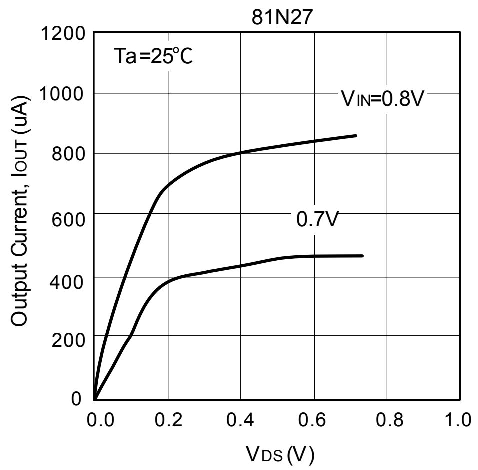


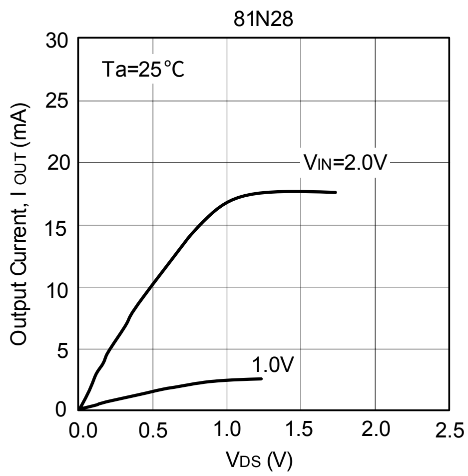
■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

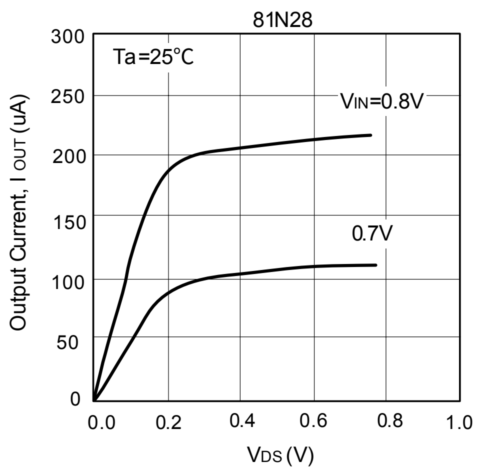




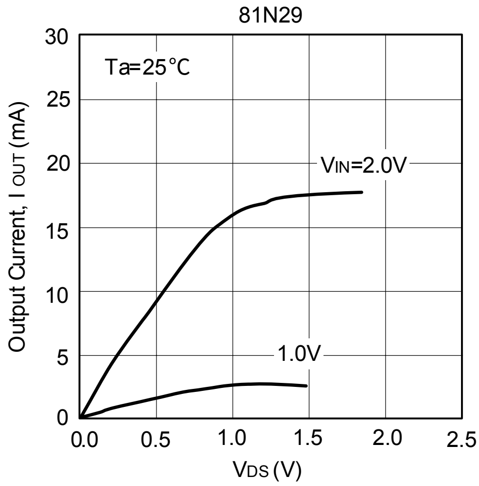


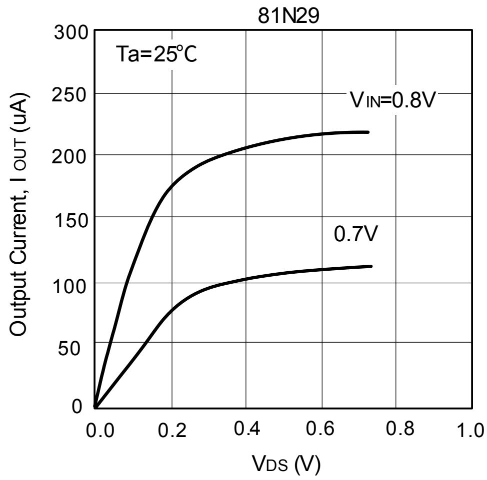


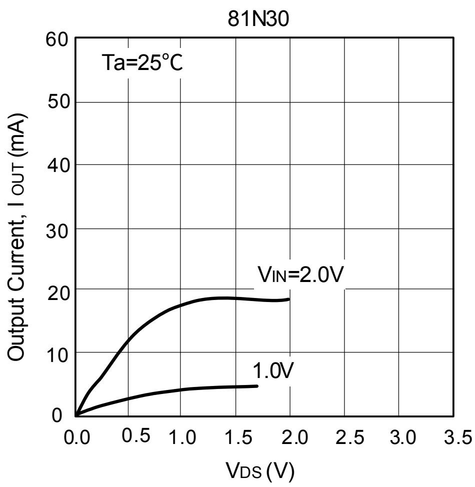


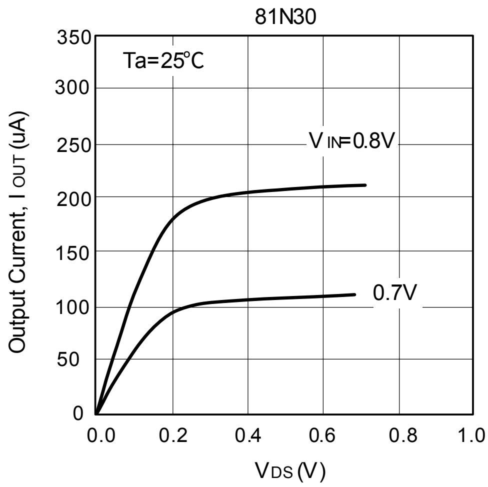


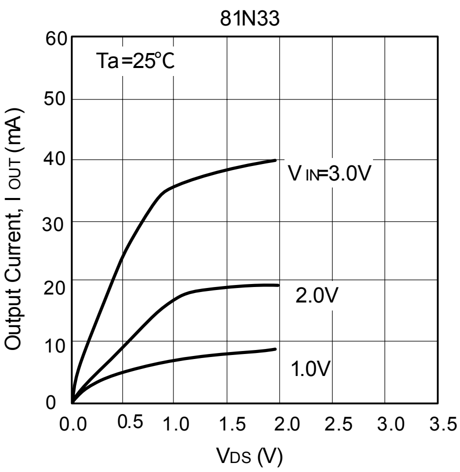
■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

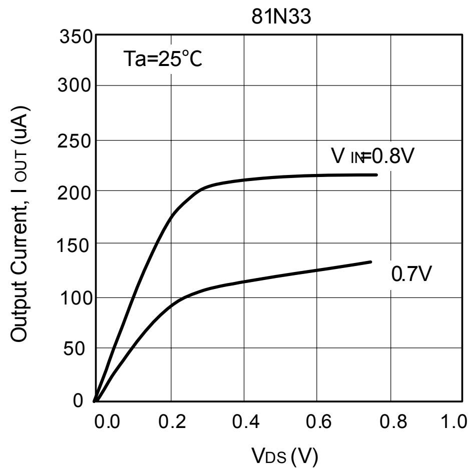












■ TYPICAL PERFORMANCE CHARACTERISTICS(Cont.)

